

AMENDMENTS TO THE DRAWINGS

Applicants have amended the drawings to address the objections in the Office Action related to shading. More specifically, applicants submit Replacement Sheets showing amended Figs. 1- 7, which eliminate the shading considered objectionable. Amended Fig. 3 omits reference number 21b.

REMARKS

I. Status Of The Claims

Applicants note the acknowledgement in the Office Action of the claim for foreign priority under Section 119, and the indication that all certified copies of the priority documents have been received.

Applicants respectfully submit that the corrected drawings submitted with this Response resolve the objections as to shading. Also, corrected Fig. 3, omits reference number 21b.

Claim 31 was rejected under Section 112 for indefiniteness, due to its reference to "the cold storage unit." Claim 31 has been amended to depend on claim 27, rather than claim 19. Accordingly, applicants respectfully assert that this rejection is now moot.

Substantively, claims 19-23 and 27-32 were rejected for alleged lack of novelty under Section 102(b), based on Kroebig '776. Applicants respectfully traverse this rejection. Nonetheless, except for claim 32, this rejection is rendered moot by the amendment to claim 19. More particularly, claim 19 has been amended to expressly incorporate the features of prior dependent claims 23, 24, and 26. Moreover, dependent claims 24 and 26 have been cancelled via this amendment.

In addition, claims 19-21 and 24-32 were rejected for alleged lack of novelty under Section 102(b), based on Kleen '736. Applicants also respectfully traverse this rejection. But again, except for claim 32 this rejection is also rendered moot by the amendment to claim 19.

And finally, claims 24-26 were rejected for alleged obviousness under Section 103, based on a combination of Kroebig '776 and Hallin '951. Applicants respectfully traverse this rejection. Moreover, applicants respectfully request reconsideration of the claims.

II. The Claimed Subject Matter

Independent claim 19 now includes the features of prior dependent claims 23, 24, and 26. More specifically, independent claim 19, and hence dependent claims 20-22, 25, and 27-31, now expressly includes the features of a temperature sensor operatively connected to the cooling device, a regulator valve operatively connected to the piping system, and a regulation device operatively connected to the ventilator and to the regulator valve so as to control the ventilator and the regulator valve according to the temperature detected by the temperature sensor.

These features are included within the context of claim 19, directed to an aircraft having a cooling device for expelling heat from a heat source located in the interior of the aircraft to a heat sink. More particularly, the device includes a piping system sealed against the surrounding atmosphere. The piping system has a heat intake section thermally coupled with the heat source and a heat output section thermally coupled with the heat sink, and an essentially adiabatic conveyance section located therebetween. The piping system is filled with the heat conveyance medium which, when heat is received in the heat intake section from the heat section, undergoes a transition from the liquid phase to the gaseous phase, then flows into the heat output section, then condenses when discharging heat to the sink, and then flows back into the heat intake section, wherein the heat sink includes a section of an external wall of the aircraft. At least one heat exchanger operatively couples the piping system to one of the heat source and the heat sink, so as to cause heat transfer in at least one of the heat intake section and the heat output section, respectively. A ventilator operatively connects to the at least one heat exchanger. The ventilator is adapted to control the transfer of heat between the at least one heat exchanger and one of the heat source and the heat sink.

This combination of features provides a number of advantages. More specifically, the recited structure uses the latent heat of the heat conveyance medium, thereby increasing the specific heat transfer performance of the cooling system compared to conventional systems

which use air. Moreover, this cooling system is a closed system, i.e., sealed against the surrounding atmosphere, such that heat transfer takes place via the walls of the piping system and the heat conveyance medium does not directly contact any external components. Thus, the system avoids the potential for undesirable moisture penetration into the heat conveyance medium circuit. For instance, using a closed system eliminates undesirable condensation effects, which can lead to undesirable icing or even corrosion of sections of the aircraft. In addition, this cooling system has a lower weight, and also eliminates the need for conveyance devices, such as pumps, which would otherwise be needed to move the heat dissipating medium.

Independent claim 32 is directed to a method for the discharge of heat from a heat source located in the interior of an aircraft to a heat sink, wherein the aircraft includes a closed piping system sealed against the surrounding atmosphere, a heat intake section thermally coupled to the heat source and a heat output section thermally coupled to the heat sink, with an essentially adiabatic transport section located therebetween. The piping system is filled with a heat conveyance medium similar to that described with respect to claim 1.

The specific method steps of claim 32 refer to causing, via at least one heat exchanger which operatively couples the piping system to one of the heat source in the heat sink, heat transfer into one of the heat intake section and the heat output section, respectively, and controlling, via a ventilator, a heat transfer between the at least one heat exchanger and the one of the heat source and the heat sink.

III. The Deficiencies of the Cited Prior Art

Kroebig '776 fails to disclose a ventilator. Moreover, Kroebig '776 fails to disclose any active control of heat transfer between a heat exchanger, i.e., in this case the skin of the missile, and a heat source component. The cooling device of Kroebig '776 is located within a missile, which usually flies at such a relatively high velocity that friction between the missile skin and the ambient air would cause the missile skin to heat up. Thus, it is doubtful whether

Kroebig '776 could even provide a sufficient cooling effect via the heat pipe system described therein.

Kleen '736 does not include a ventilator. Rather, Kleen '736 discloses an air duct 31, (see Fig. 4), and relies on the introduction of ambient air from outside the aircraft, due to movement of the aircraft. More specifically, Kleen '736 discloses an input shutter through which ambient air flows from outside of the aircraft to the interior thereof, and also an output shutter for conducting ambient air from the interior of the aircraft. Thus, Kleen '736 discloses the need for significant internal structure used to route, to the inside of the aircraft, ambient air received from outside the aircraft. Kleen '736 teaches the need for, and the use of, such structure so that the desired heat transfer occurs internally. Accordingly, Kleen '736 also does not disclose using a section of the external wall of the aircraft as a heat sink.

Hallin '951 discloses a refrigerator with a piping system. Hallin '951 has nothing to do with the cooling system of an aircraft. Instead, Hallin '951 merely describes a refrigerator.

IV. The Remaining Claims are Patentable

Applicants remain of the view that neither Kroebig '776 nor Kleen '736 properly anticipates any of the claims of the present application, either in their current form or in their prior forms. More specifically, neither of these two relied-upon references discloses a ventilator of the type recited in the claims, nor the use of a section of an outer wall of the aircraft for a heat sink. For these reasons, applicants reassert their previously stated view that all of the alleged lack of novelty rejections based on either one of these references are improper.

Nonetheless, at least with respect to all remaining claims except claim 32, the current alleged lack of novelty rejections, under Section 102(b), based on Kroebig '776 or Kleen '736, are rendered moot in view of the amendments to independent claim 19. Thus, the only

claim that remains rejected under Section 102 is independent claim 32. Even this claim has been amended to more clearly recite that the piping system is a closed piping system.

For at least the reasons stated above with respect to independent claims 19 and 32, applicants respectfully assert that each of remaining claims 19-22, 25, and 27-32 is novel over the cited prior art.

Although claims 24-26 have been cancelled, the subject matter thereof has been incorporated into independent claim 19. Thus, applicants deem it appropriate to address, in this response, the prior rejection of claims 24-26, under Section 103, based on an asserted combination of Kroebig '776 and Hallin '951.

More specifically, applicants respectfully assert that each of the remaining claims is also unobvious over the prior cited art, and particularly over the relied-upon combination of Kroebig '776 and Hallin '951. Notably, at page 14 of the Office Action it is conceded that "Kroebig is silent on a temperature sensor operatively connected to the cooling device, ventilator or regulator valve." The Office Action next asserts that it would be appropriate to look to Hallin '951, directed to a refrigerator, for the purpose of incorporating a temperature sensor located adjacent a heat source.

Applicants respectfully disagree with this premise and this logic. This reasoning for combining Kroebig '776 and Hallin '951, as set forth in the Office Action, is based on mere speculation, not objective reasoning. As such, the relied-upon combination of prior art references is improper, and the rejection should be withdrawn.

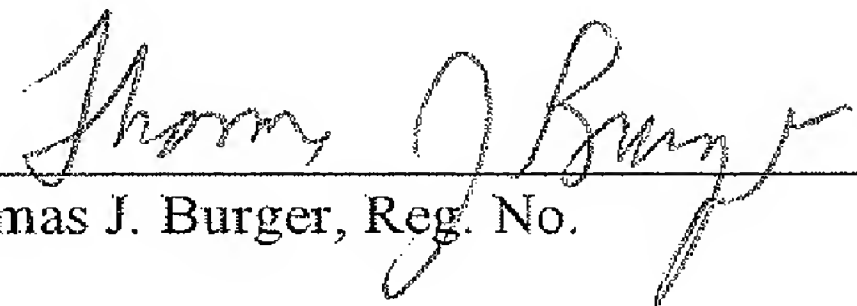
Even if a hypothetical person of ordinary skill in the art were to combine these two cited references, the resulting hypothetical combination would still be deficient, because it still would fail to include a ventilator, as recited in at least some of the claims. And most importantly, it would still fail to include a structure whereby the heat sink includes a section of an external wall of an aircraft. Any rejection based solely on these cited references is clearly improper because these references fail to disclose this feature. The Office Action errs

in failing to give any patentable weight to this claimed feature. For at least these reasons, applicants respectfully assert that each of the remaining claims patentably defines over the cited prior art. Accordingly, applicants request an allowance of the remaining claims without further delay.

CONCLUSION

It is believed that no fee is due for this filing. If any fee is deemed due, consider this as an authorization to charge Deposit Account 23-3000 therefore.

Respectfully submitted,
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